

Styrenic block copolymer based hot-melt adhesives, their use for disposable soft goods, and tackifying resins contained therein

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Abstract of TW438873B

Disclosed are hot-melt adhesive compositions suitable for the manufacture of soft goods. They have a melt viscosity of 60,000 mPa.s or less at a temperature of 120 DEG C and include: (a) 50 to 150 parts by weight of a styrenic block copolymer or mixtures and/or modified and/or hydrogenated derivatives thereof; (b) 20 to 450 parts by weight of a tackifying resin which, when incorporated into a reference composition, leads to the following properties: a tan delta value of 3.5 or less, wherein tan delta is defined as the ratio between the loss modulus and the storage modulus of said composition and an elastic retention on spandex fibers (300%) or natural latex rubber (200%) after 4 h at 40 DEG C of 70% or more; and a crossover temperature of 95 DEG C or less. Further disclosed are novel partially hydrogenated hydrocarbon resins which are useful as tackifying resins and have the following properties: (a) a ring and ball softening point (R&B) of 50 DEG C to 150 DEG C; (b) a mixed methylcyclohexane aniline cloudpoint (MMAP) of 10 DEG C to 75 DEG C; (c) a di-acetone alcohol cloudpoint (DACP) of 35 DEG C or less; (d) a molecular weight (Mz) of 10,000 Dalton or less and (e) a UV absorbance at 268 nm ranging from 2.0 to 5.0.

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TW 438873

STYRENIC BLOCK COPOLYMER BASED HOT-MELT ADHESIVES, THEIR USE FOR DISPOSABLE SOFT GOODS, AND TACKIFYING RESINS CONTAINED THEREIN

Abstract

Disclosed are hot-melt adhesive compositions suitable for the manufacture of soft goods. They have a melt viscosity of 60,000 mPa.s or less at a temperature of 120°C and include: (a) 50 to 150 parts by weight of a styrenic block copolymer or mixtures and/or modified and/or hydrogenated derivatives thereof; (b) 20 to 450 parts by weight of a tackifying resin which, when incorporated into a reference composition, leads to the following properties: a $\tan \delta$ value of 3.5 or less, wherein $\tan \delta$ is defined as the ratio between the loss modulus and the storage modulus of said composition and an elastic retention on spandex fibers (300%) or natural latex rubber (200%) after 4 h at 40°C of 70% or more; and a crossover temperature of 95°C or less.

Further disclosed are novel partially hydrogenated hydrocarbon resins which are useful as tackifying resins and have the following properties: (a) a Ring and Ball softening point (R&B) of 50°C to 150°C; (b) a mixed methylcyclohexane aniline cloudpoint (MMAP) of 10°C to 75°C; (c) a Di-Acetone Alcohol cloudpoint (DACP) of 35°C or less; (d) a molecular weight (Mz) of 10,000 Dalton or less; and (e) a UV absorbance at 268 nm ranging from 2.0 to 5.0.

Claims

1. A hot-melt adhesive composition which comprises:
 - (a) 50 to 150 parts by weight of a styrenic block copolymer or mixtures and/or modified and/or hydrogenated derivatives thereof; and
 - (b) 20 to 450 parts by weight of a tackifying resin,wherein the tackifying resin (b) is a partially hydrogenated hydrocarbon resin having the following properties:
 - (i) a Ring and Ball (R&B) softening point of 50°C to 150°C;
 - (ii) a mixed methylcyclohexane aniline cloudpoint (MMAP) of 10°C to 75°C;
 - (iii) a Di-Acetone Alcohol cloudpoint (DACP) of at most 35°C;
 - (iv) a z-average molecular weight (Mz) of at most 10,000 Dalton; and
 - (v) a UV absorbance at 268 nm ranging from 2.0 to 5.0,and when incorporated into a reference composition consisting of 100 parts by weight of a styrene-isoprene-styrene copolymer having a styrene content of 20 to 30% by weight, 250 parts by weight of said tackifying resin, 50 parts by weight of a paraffinic/naphthenic (70/30 weight/weight) extender oil and 2 parts by weight of a stabilizer consisting essentially of pentaerythrityl-tetrakis[3-(3,5-di-t-butyl-4-

hydroxyphenyl)-propionate] , said resin leads to the following properties of said reference composition:

a melt viscosity of 60,000 mPa.s or less at a temperature of 120°C;

a $\tan \delta$ value of 3.5 or less, wherein $\tan \delta$ is defined as the ratio between the loss modulus and the storage modulus of said composition;

an elastic retention on spandex fibers (300%) or natural latex rubber (200%) after 4 h at 40°C of 70% or more; and

a crossover temperature of 95°C or less.

2. The hot-melt adhesive composition of claim 1 wherein the tackifying resin (b) is a partially hydrogenated aromatic C9 hydrocarbon resin having the following properties:

R&B softening point (°C)	100±5°C
MMAp (°C)	52±5 °C
DACP (°C)	2±5°C
UV- α 268 nm	2.9±0.2
Mz (Dalton)	1,500±30%.

3. The hot-melt adhesive composition of claim 1 characterized in that the styrenic block copolymer (a) is selected from

(a') copolymers wherein the respective monomeric moieties are arranged in an alternating sequence having the general sequence of A-B-A or A-B-A-B-A-B-; and/or

(a'') teleblock copolymers which comprise a molecule having at least three branches radially extended outwardly from a central hub, and each of the branches have terminal blocks "A" and an elastomeric segment "B" in the center;

wherein "A" represents a non-elastomeric block based on the homopolymers or copolymers of styrenic and vinyl monomers, α olefins, alkylene oxides, acetals and urethanes, and "B" represents an unvulcanized elastomeric block derived from isoprene, butadiene, vinyl isoprene or vinyl butadiene and modified and/or hydrogenated versions thereof.

4. The hot-melt adhesive composition of claim 1 which further includes >0 to 150 parts by weight of (c) a plasticizing oil.

5. The hot-melt adhesive composition of claim 4 wherein the plasticizing oil (c) is at least one compound selected from the group consisting of naphthenic/paraffinic oils, olefinic oil, low molecular weight polymers, vegetable and animal oils including glycerol esters of fatty acids and polymerization products thereof, liquid resins and hydrogenated versions of these compounds.

6. The hot-melt adhesive composition of claim 1 which further includes >0 to 4 parts by weight of (d) a stabilizer.
7. The hot-melt adhesive composition of claim 1 which further includes 100 or less parts by weight of (e) a viscosity modifying aromatic resin having the following properties:
 - a R&B softening point of 50°C to 150°C;
 - a MMAP cloudpoint of 20°C or less
 - a DACP cloudpoint of 0°C or less, and
 - a Mz value of 15,000 Dalton or less.
8. The hot-melt adhesive composition according to claim 7 wherein the viscosity modifying aromatic resin (e) is selected from the group consisting of:
 - (e') aromatic petroleum hydrocarbons; and
 - (e'') polar or other modifying aromatic petroleum hydrocarbon resins, including copolymers and terpolymers of aromatic petroleum hydrocarbon resins with vinyl monomers and/or acrylic monomers, and mixtures thereof.
9. The hot-melt adhesive composition according to claim 8 wherein the viscosity modifying aromatic resin (e) is selected from the group consisting of copolymers and terpolymers of styrene, vinyl toluene and (α)-methyl-styrene.
10. The hot-melt adhesive composition according to claim 9 wherein the viscosity modifying aromatic resin (e) is used as a viscosity modifier.
11. The hot-melt adhesive composition according to any of claims 1 to 9 for used in the manufacture of disposable soft goods and/or laminates or composites of soft materials.
12. The hot-melt adhesive composition according to claims 11, which is used as an adhesive in construction to bond the polyethylene to the nonwoven and absorbent pad; and/or as an adhesive for landing strips; and/or as an adhesive to bond the elastic material to the backsheet of the polyethylene in the leg and/or waist area; and/or as a core adhesive to increase the strength of the core; and/or for bonding a non-woven material to the backsheet of a diaper; and/or as a multi-purpose adhesive.
13. The hot-melt adhesive composition according to any of claims 1 to 9 which can be applied by extrusion or spraying.
14. A partially hydrogenated aromatic C9 hydrocarbon resin having the following properties:

a Ring & Ball softening point (R&B)	100±5°C
a mixed methylcyclohexane aniline cloudpoint (MMAp)	52±5 °C
a Di-Acetone Alcohol cloudpoint (DACP)	2±5°C
UV- α 268 nm	2.9±0.2
Mz (Dalton)	1,500±30%.

15. The partially hydrogenated aromatic C9 hydrocarbon resin according to claim 14, which is useful as a tackifying resin of a hot-melt adhesive composition.
16. The partially hydrogenated aromatic C9 hydrocarbon resin according to claim 14 for use in the manufacture of a hot-melt adhesive composition for spraying application.
17. The partially hydrogenated aromatic C9 hydrocarbon resin according to claim 14 for use in the manufacture of a hot-melt adhesive composition for disposable soft goods and/or laminates or composites of soft materials.
18. The partially hydrogenated aromatic C9 hydrocarbon resin according to any one of claims 15 to 17, wherein said hot-melt adhesive composition is used as an adhesive in construction to bond the polyethylene to the nonwoven and absorbent pad; and/or as an adhesive for landing strips; and/or as an adhesive to bond the elastic material to the backsheet of the polyethylene in the leg and/or waist area; and/or as a core adhesive to increase the strength of the core; and/or for bonding a non-woven material to the backsheet of a diaper; and/or as a multi-purpose adhesive.
19. The partially hydrogenated aromatic C9 hydrocarbon resin according to claim 14, which leads the following properties to a styrenic hot-melt adhesive composition:
a melt viscosity of 60,000 mPa.s or less at a temperature of 120°C;
a tan δ value of 3.5 or less, wherein tan δ is defined as the ratio between the loss modulus and the storage modulus of said composition; and/or
an elastic retention on spandex fibers (300%) or natural latex rubber (200%) after 4 h at 40°C of 70% or more; and/or
a crossover temperature of 95°C or less.